FREE-FLOATING PLANTS OF OHIO.

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In general all hydrophytes may be classed into two groups, those rooted in the soil and those which are free. The rooted plants are either completely submerged or they may have part of the body above and part below the surface of the water. Among the latter type of plants are numerous species with only the leaf blades floating on the surface, as Potamogeton natans and Castalia odorata. The non-rooted vegetation consists (1) of microscopic, free-floating and free-swimming Thallophytes and (2) of higher plants adapted to a free-floating condition, among which must also be included rooted forms accidently torn from their anchorage and the specially developed propagative buds known as hibernacula. The microscopic plants together with the Protozoa and other low animal forms make up the plankton, while the second type of societies has been called the derived or secondary phyto-plankton.

The typical members of the secondary plankton are passive, free-floating plants which as appears from their general structure and life cycle were evidently derived from rooted ancestors. In free-floating plants like the duckweeds, which are among the most highly specialized forms, the leaves are entirely absent and the stem is a flattened, disc-like body, or in a few species it is nearly spherical. The plants are buoyed up on the surface of the water by means of air cavities developed either in the body of the stem or in the leaves. The most striking of these adaptations is a spongy enlargement of the petiole as in the water hyacinth. The air reservoirs usually consist of spongy tissue with large intercellular spaces.

Most floating plants have a suitable counterpoise to prevent the plant from being turned upside down by ripples and waves. In Azolla and most of the duckweeds the counterpoise consists of one or more dangling roots. In Salvinia dissected leaves looking much like hanging roots act as counterpoises. In Ricciocarpus the counterpoise consists of numerous slender scales.

There are various adaptations to afford protection against wetting. The larger duckweeds have a very smooth and glistening surface from which water rolls in the spheroidal form. Lemna trisulca which is usually submerged does not have the power of shedding water. In Salvinia curious, tufted hairs, the tips of which spread out in three or four branches, are developed on the upper surface. When the plant is overturned air is imprisoned by these tufted hairs and it is immediately turned right side up.

Surface floating plants are exposed to intense light. Some

species like Azolla develop anthocyan while others like Salvinia are protected by hairs.. In some, as in Lemna trisulca the chlorophyll granules shift their position with the changes in the intensity of the light. In diffused light the granules lie against the horizontal walls, but if strong light strikes the surface perpendicularly they are transferred to the vertical walls.

Vegetative propagation is usually effected with great rapidity by the branching and budding of the stem and the separation of these branches. The duckweeds and other free-floating plants frequently cover great areas very closely and largely prevent the formation of waves when one throws a stone into the water. In the south the water hyacinth (Piaropus crassipes (Mart.) Britt.) covers large areas of rivers and lakes, causing much inconvenience to navigation.

Among the Ohio plants which may be found floating free in the water though normally attached may be mentioned the following: Hottonia inflata Ell., Philotria canadensis (Mx.) Britt., Ceratophyllum demersum L., Myriophyllum sp., Utricularia sp., and Potamogeton sp.

Utricularia has little bladders which not only assist in floating the plant but act as traps for capturing small organisms which are digested for food.

The typical, free-floating plants which are found in the secondary plankton of Ohio are as follows:

LIVERWORTS.

Riccia fluitans L.
Ricciocarpus natans (L.) Corda.

WATER FERNS.

Salvinia natans (L.) Hoffm.
Azolla caroliniana Willd.

MONOCOTYLS.

Spirodela polyrhiza (L.) Schl.
Lemna trisulca L.
Lemna cyclostasa (Ell.) Chev.
Lemna minor L.
Wolffia columbiana Karst.
Wolffia punctata Griseb.